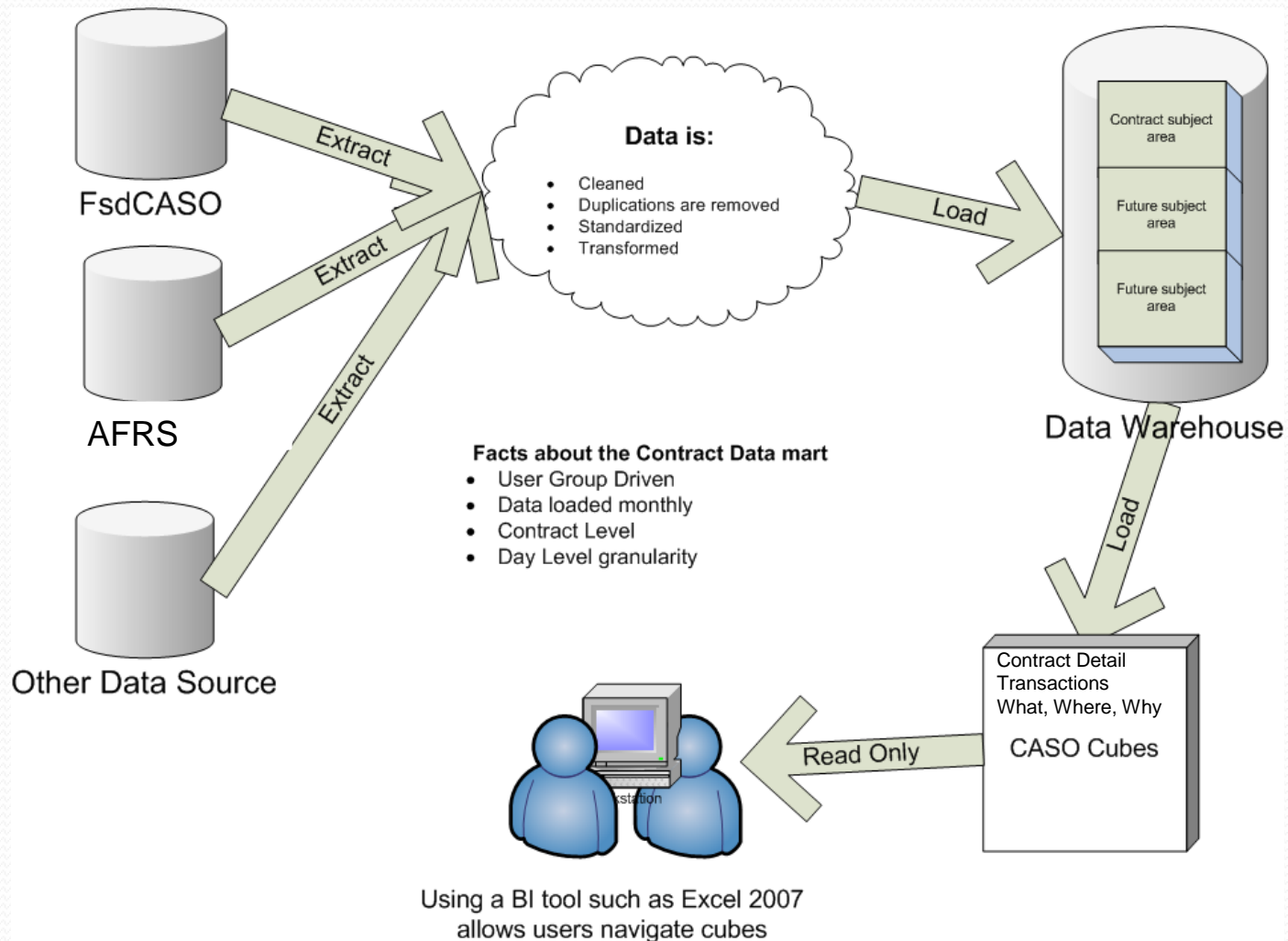


# Working with Cubes

## Agenda

- Overview of a Data Warehouse and Cubes
- Decision making process
- Terminology
- Data Dictionary
- What is a cube
- Navigating Cubes with Excel 2007

# Data Warehouse Flow



# The Decision Making Process

- Identify the need (Measure Group)
  - How much money was spent in Benton County last year?
- Determine the attributes (Dimensions)
  - What information do you want? Counts, Money, what programs, contractors, etc
- Locate the attributes in the Cube
- Perform the query
- Report and/or act on the analysis

# What is a query?

- A query is really a translation of question:
  - Have the # of CDBG grants increased or decreased in Lewis County from 2003 to 2004?
  - Has the \$ amount of CDBG grants increased or decreased in Lewis County from 2003 to 2004?
  - Which county received most PWB \$ in 2006?

# Data Warehouse

- Cubes are a different view of the subjects areas within a Data Warehouse and a perspective is a view of a cube
  - Dept of Commerce has one cube with 3 perspectives
    1. Contract Detail
    2. Transactions
    3. What – Where – Why

# Contract subject area

- Future Subject Areas might be:
  - HR (maybe track success factors)
  - LGD (assessment, capacity building)
  - ITED (promoting trade)
- Some Subject Areas overlap other Subject Areas
  - Contract applications sometimes result in an executed contract. A Cube built for analysis of “lifecycles of an application” would touch both “Application subject area” and “Contracts subject area”

# Data Dictionary

- The Cube data dictionary will help you determine what columns or attributes inside of Excel you wish to report on
- The dictionary will also help with terminology:
  - CFDA Num Description
    - Description of Catalog of Federal Domestic Assistance (CFDA) number assigned to the contract.
  - Contract ID
    - Unique contract ID assigned to contract upon entry of contract into CASO. Sometimes referred to as ASD Contract Number. Used as unique identifier on transactions sent to AFRS related to the contract.

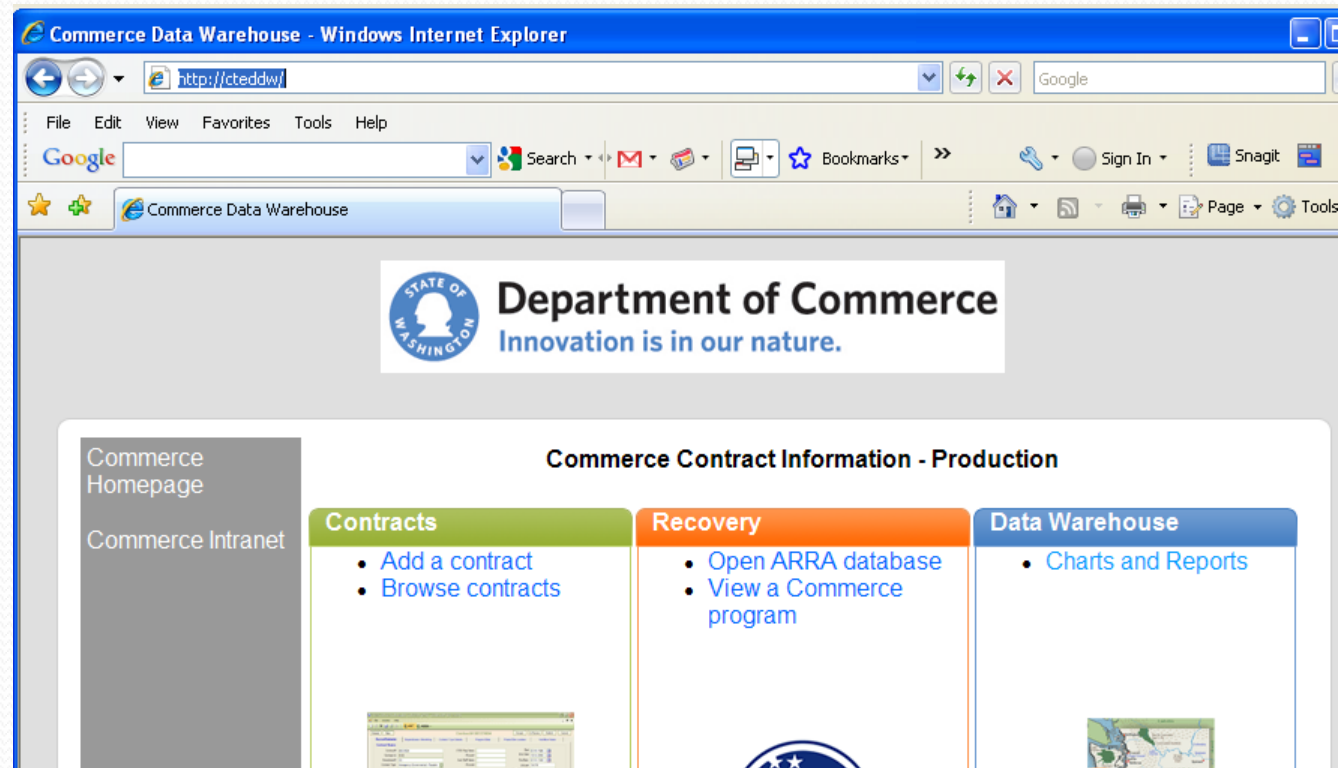
# Proper Analysis within CUBES

- Correlation does not imply causation
  - As ice cream sales increase, the rate of drowning deaths increases sharply - Therefore, ice cream causes drowning.
  - The aforementioned example fails to recognize the importance of time in relationship to ice cream sales. Ice cream is sold during the summer months at a much greater rate, and it is during the summer months that people are more likely to engage in activities involving water, such as swimming. The increased drowning deaths are simply caused by more exposure to water based activities, not ice cream.

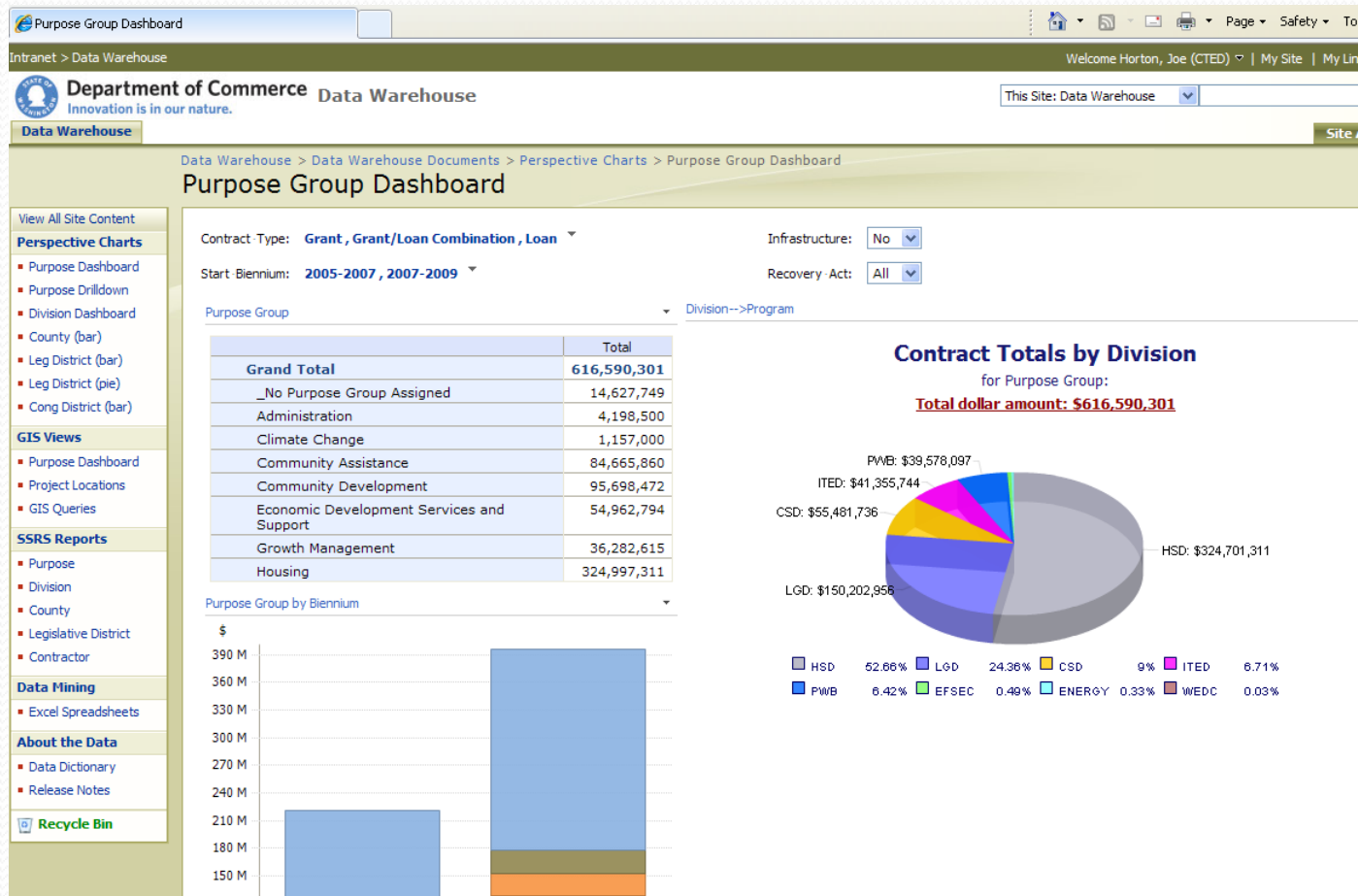


# Jumping off page

- The starting point for all Data Warehouse activities:  
<http://cteddw>



# Portal Page Navigation



# Data Warehouse load time

- Typically analysis within Cubes are trends measured over periods of time – the Data Warehouse is loaded on a set schedule – the Commerce schedule is every Friday
  - Trend analysis verses Predictive analysis
  - How much money was spent in Benton county for 2003 through 2005?
  - How many contracts did we execute in King county last year?
- Detailed up to the moment analysis and reporting is best served with OLTP Reports, such as CASO Reports.
  - What was the contract number assigned for a particular sewer project?
  - How much money was awarded for a particular contract that was executed yesterday

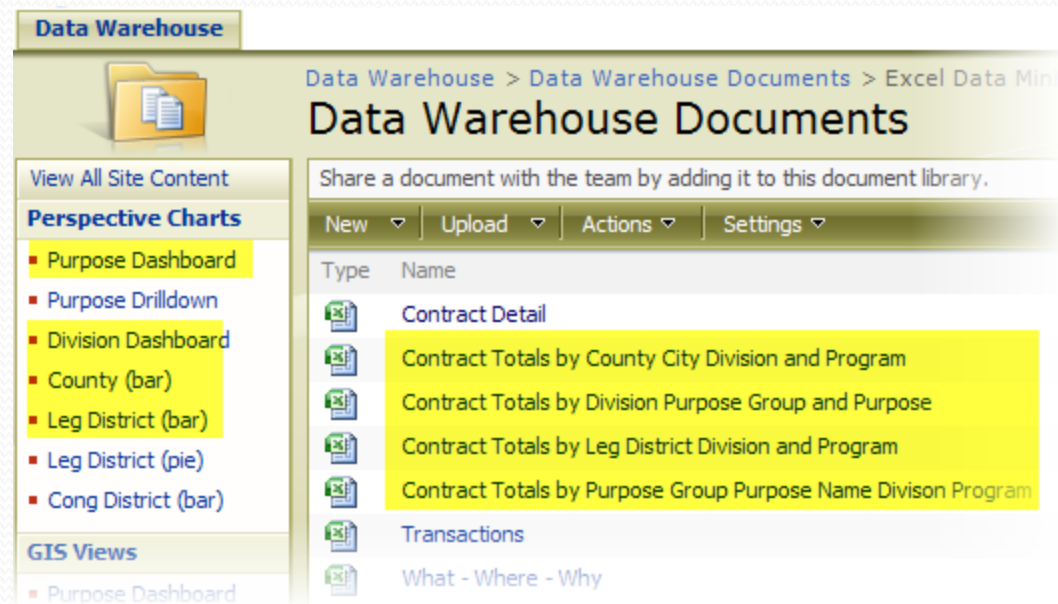
# Navigating to Data Mining area



- Click the “Charts and Reports” link
- Navigate down the left side to the “Data Mining” section
- Select “Excel Spreadsheets”

# Navigating Excel mining documents

- There are many Excel files in this document section.
- The files whose names begin with “Contract Totals by...” – are cubes inside Excel that already have selections picked for you. They mimic the charts and dashboards.



# The Perspectives

- There are 3 perspectives that have more and less detail depending on which one you choose for your mining tasks.

The screenshot displays the CTED Data Warehouse interface. At the top, the logo for the State of Washington is next to the text "CTED | Community, Trade and Economic Development Data Warehouse". Below this is a "Data Warehouse" tab. The main content area is titled "Data Warehouse Documents" and includes a breadcrumb trail: "Data Warehouse > Data Warehouse Documents > Excel Data". A sidebar on the left contains a "View All Site Content" link, a "Perspective Charts" section with a list of charts (Purpose Dashboard, Purpose Drilldown, Division Dashboard, County (bar), Leg District (bar), Leg District (pie), Cong District (bar)), and a "GIS Views" section with "Purpose Dashboard" and "Project Locations". The main area also features a "Share a document with the team by adding it to this document library." prompt, a toolbar with "New", "Upload", "Actions", and "Settings" buttons, and a table of documents. The table has columns for "Type" and "Name". The documents listed are "Contract Detail", "Contract Totals by County City Division and Program", "Contract Totals by Division Purpose Group and Purpose", "Contract Totals by Leg District Division and Program", "Contract Totals by Purpose Group Purpose Division Program", "Transactions", and "What - Where - Why". The "Contract Detail" and "Transactions" rows are highlighted in yellow.

STATE OF WASHINGTON  
**CTED** | Community, Trade and Economic Development **Data Warehouse**

**Data Warehouse**

Data Warehouse > Data Warehouse Documents > Excel Data  
**Data Warehouse Documents**

Share a document with the team by adding it to this document library.

New | Upload | Actions | Settings

Type	Name
Excel	Contract Detail
Excel	Contract Totals by County City Division and Program
Excel	Contract Totals by Division Purpose Group and Purpose
Excel	Contract Totals by Leg District Division and Program
Excel	Contract Totals by Purpose Group Purpose Division Program
Excel	Transactions
Excel	What - Where - Why

- The “Contract Detail” perspective will have all possible measures and dimensions.
- The “Transactions” perspective has a more accounting type of view – such as AFRS transactions.
- The “What – Where – Why” perspective focuses on locations

The screenshot displays the CTED Data Warehouse interface. At the top, the logo for the State of Washington is next to the text "CTED | Community, Trade and Economic Development Data Warehouse". Below this, a "Data Warehouse" tab is active. The main content area is titled "Data Warehouse Documents" and shows a list of documents. On the left, there are two sections: "Perspective Charts" and "GIS Views".

**Perspective Charts**

- Purpose Dashboard
- Purpose Drilldown
- Division Dashboard
- County (bar)
- Leg District (bar)
- Leg District (pie)
- Cong District (bar)

**GIS Views**

- Purpose Dashboard
- District Locations

**Data Warehouse Documents**

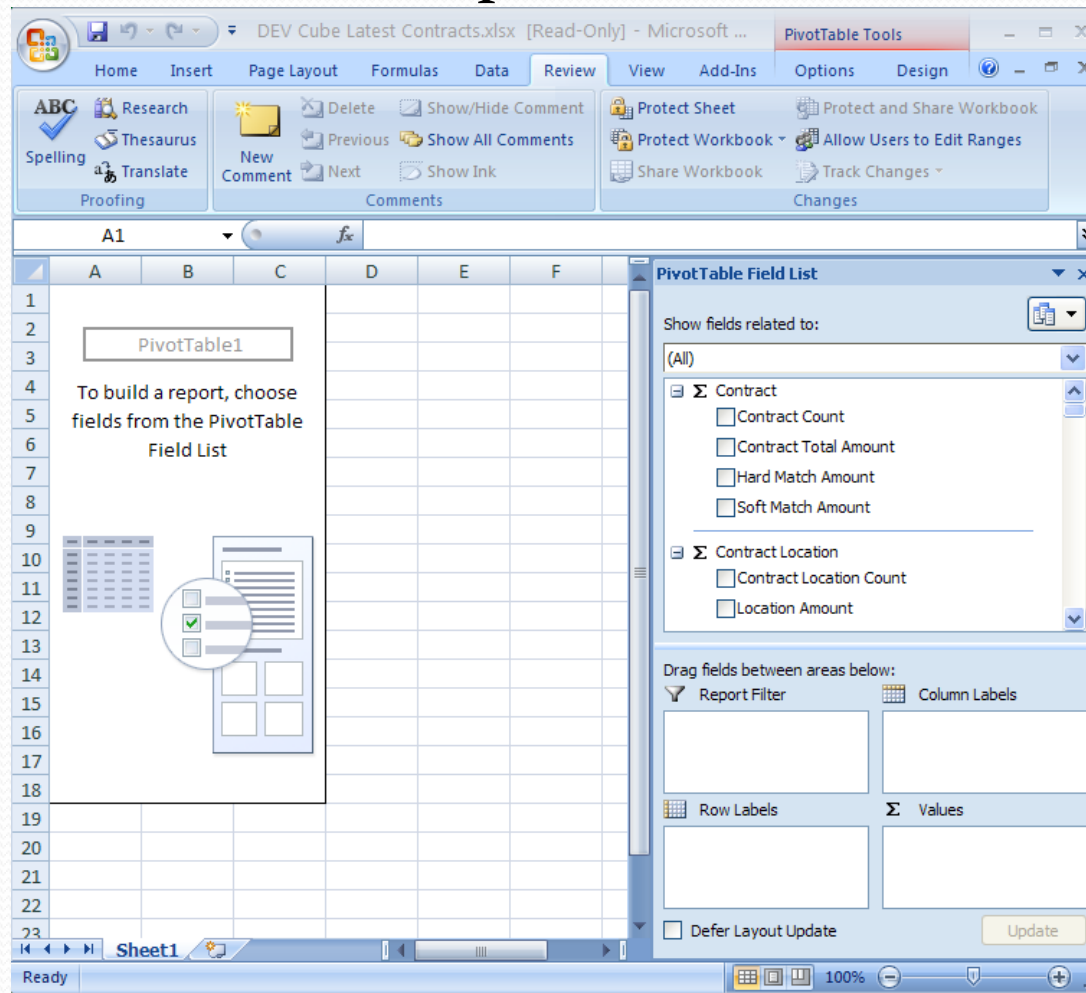
Share a document with the team by adding it to this document library.

New ▾ | Upload ▾ | Actions ▾ | Settings ▾

Type	Name
	Contract Detail
	Contract Totals by County City Division and Program
	Contract Totals by Division Purpose Group and Purpose
	Contract Totals by Leg District Division and Program
	Contract Totals by Purpose Group Purpose Division Program
	Transactions
	What - Where - Why

# Navigating Excel 2007

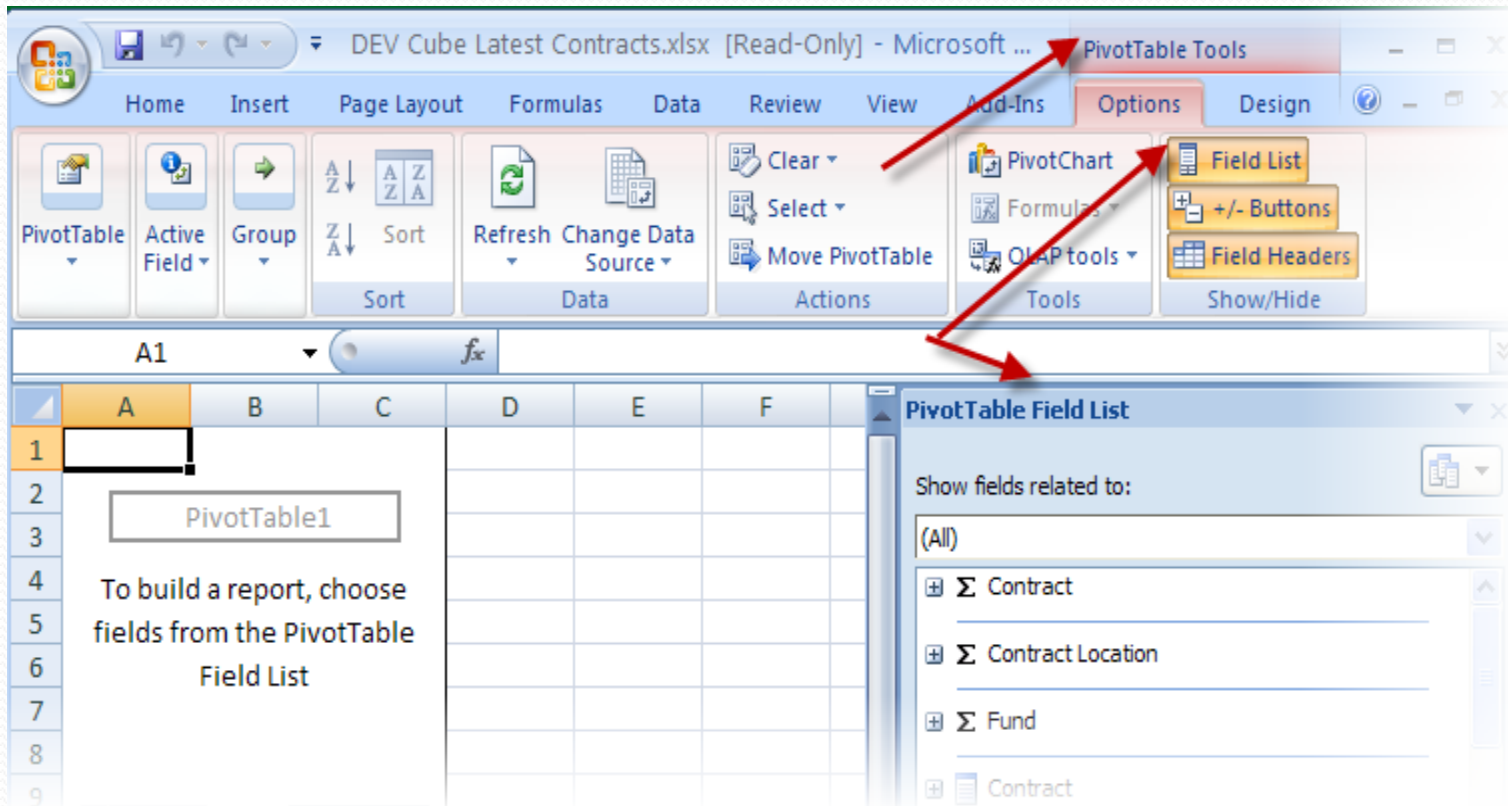
- When Contract Details opens – it will look like:





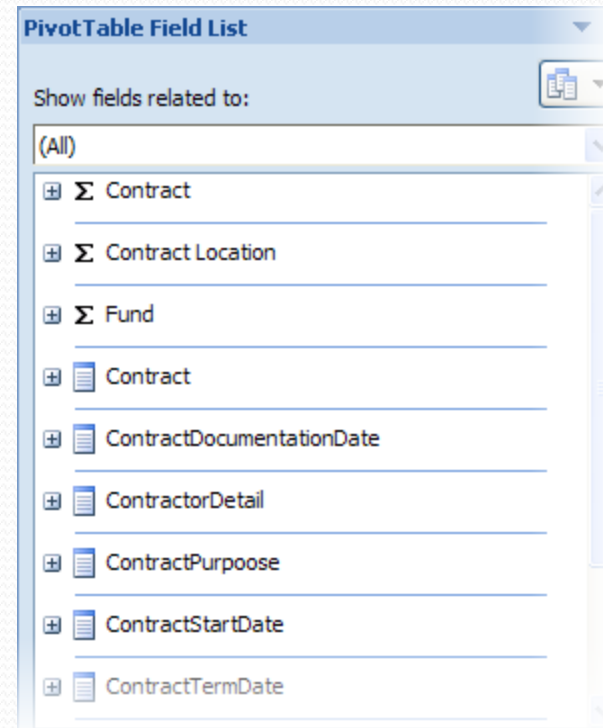
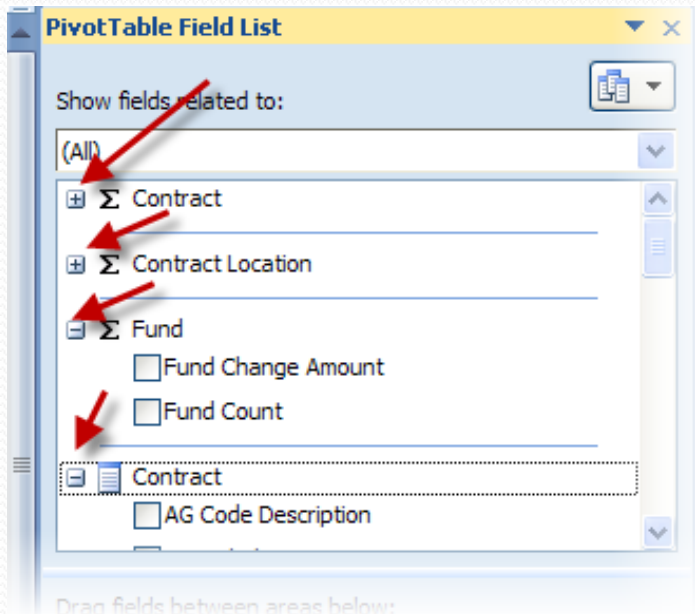
# Important Buttons

- The PivotTable tools button is on the top
  - Cube analysis (OLAP) features are accessed from here
- The Field List button hides or un-hides the Pivot Table Field List



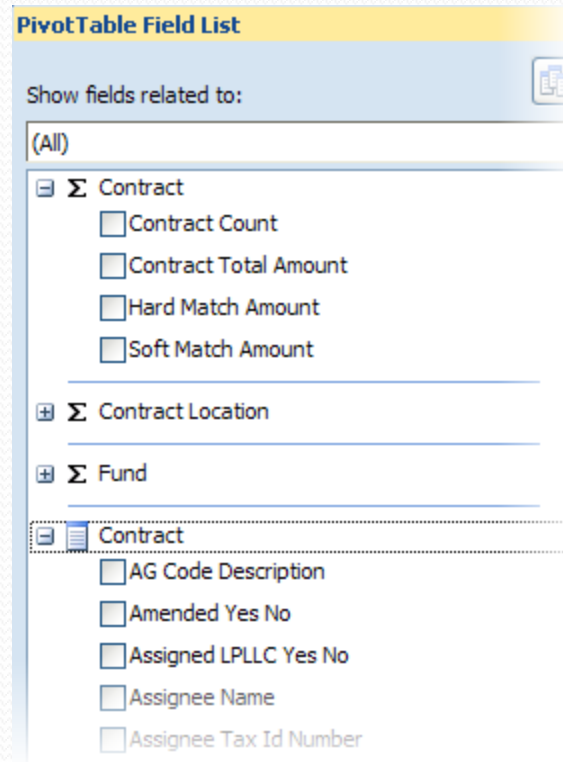
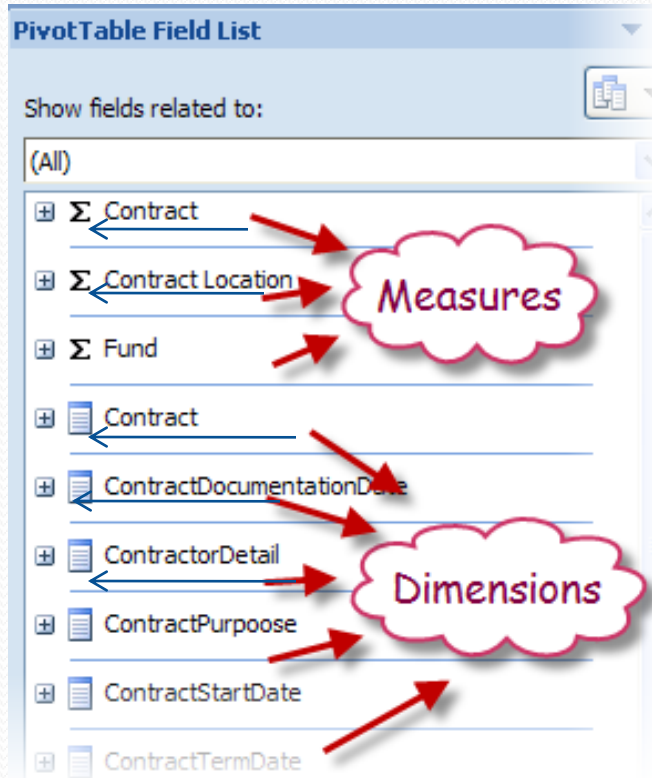
# Collapse all the categories

- By clicking the minus signs in all the dimensions and measures, they will collapse



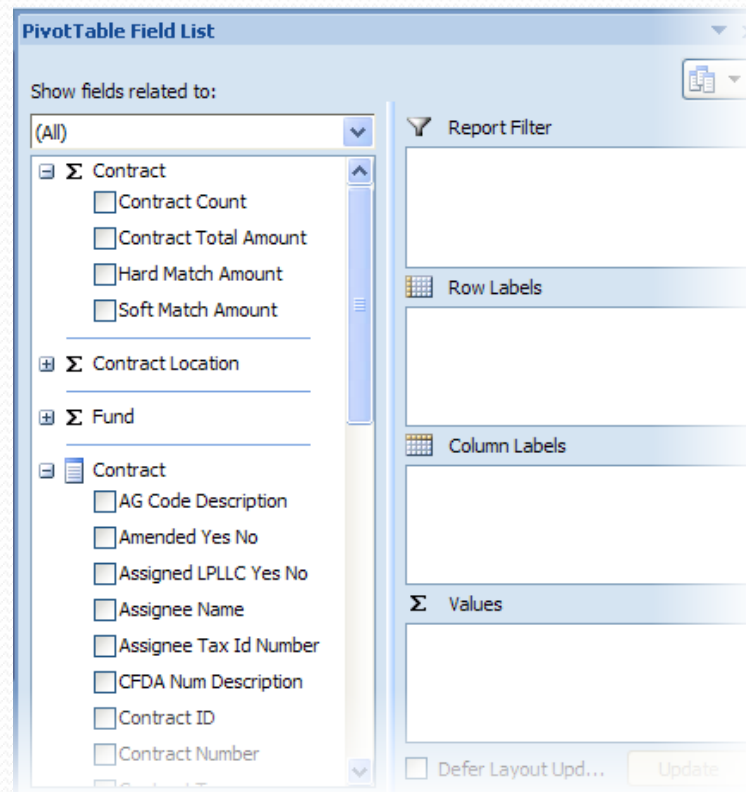
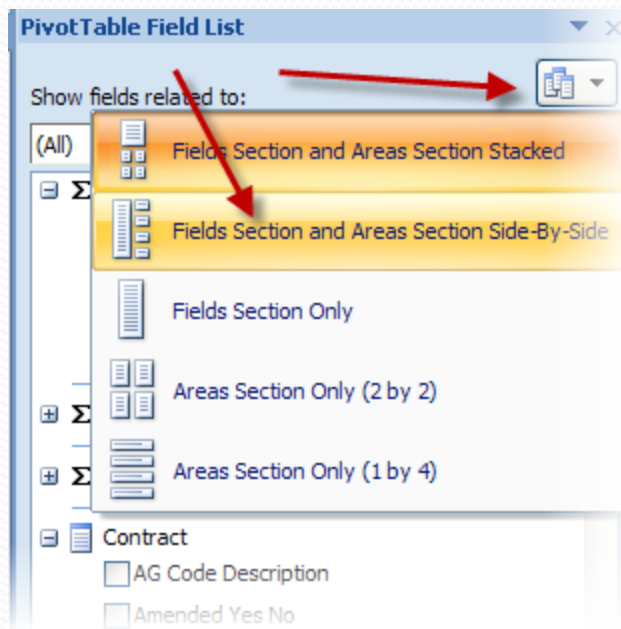
# Measures and Dimension

- The measures section is where we aggregate things like counts, dollar amounts
- Dimensions are containers with attributes/columns such as AG Code Description Contractor Name



# Pivot table layout

- To change the pivot table layout, click the button on upper right corner of Pivot table Field list, and select another layout
- This is useful depending on how many rows or columns of information you have



# Hierarchies

- A hierarchy is a series of parent-child relationships, typically where a parent member represents the consolidation of the members which are its children.
- At Commerce, many of the times we like to look at contracts first by Division, then broken out by Program – so we have a hierarchy called “Division – Program”

Housing:

Affordable Housing & Assistance:

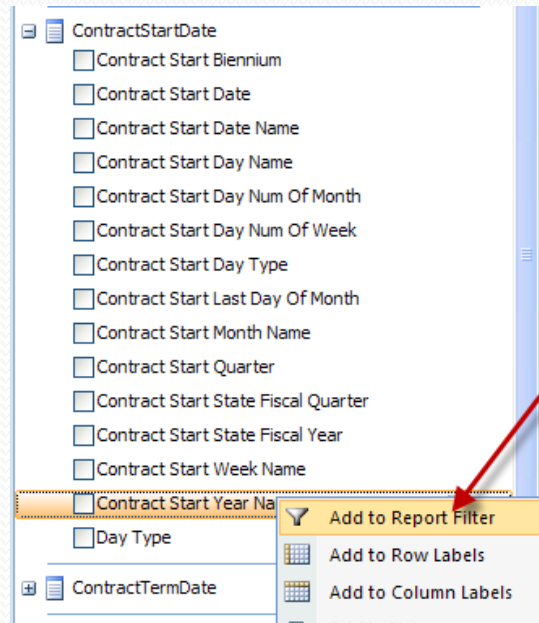
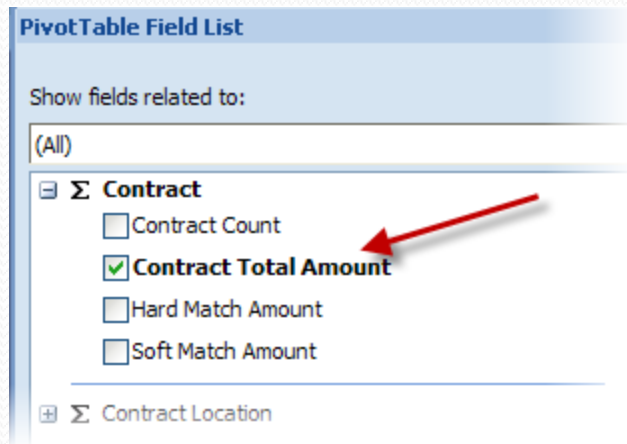
Emergency Housing Vouchers:

Farm worker Housing:

...

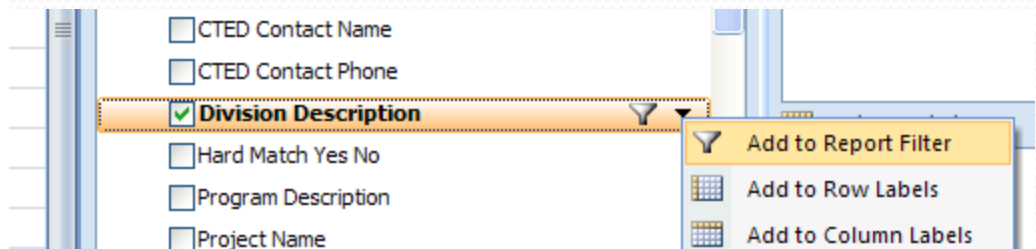
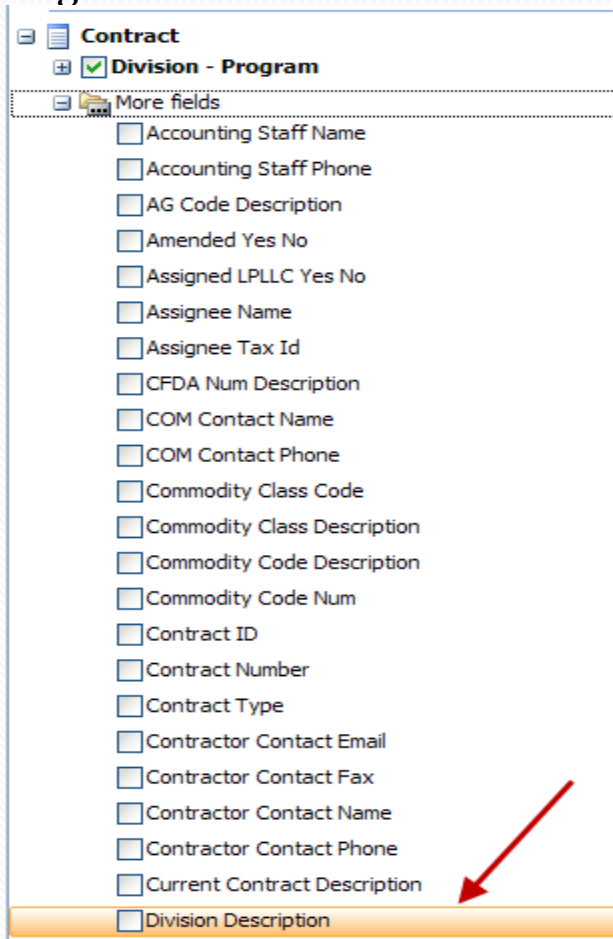
Q: Which county received the most PWB contract \$ in 2006?

- Always select the measure first – in this case it will be “Contract Total Amount”
- Next we will need to add the “Year Name” from our ContractStartDate dimension. We add this filter first to make our results much smaller.
- Create filter for 2006 year



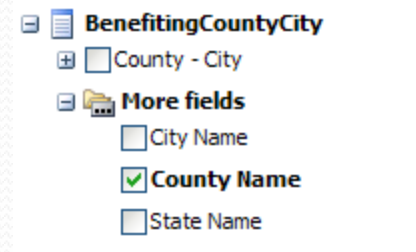
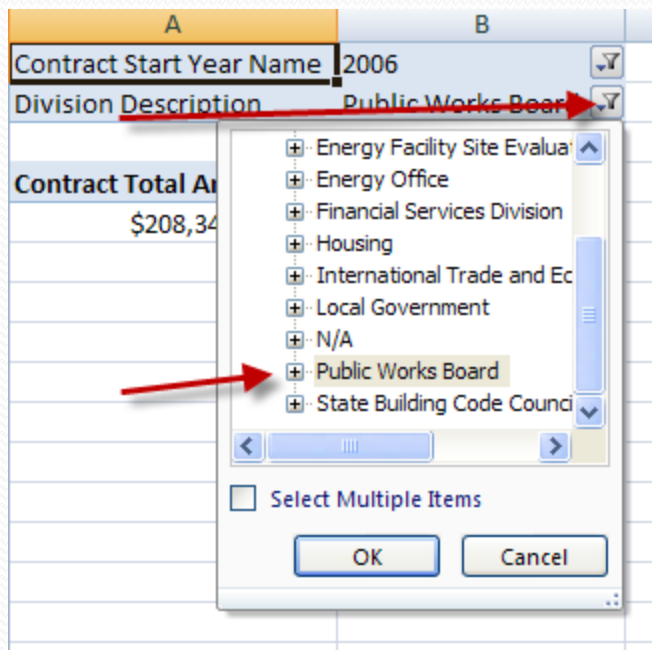
Q: Which county received the most PWB contract \$ in 2006?

- Now we need to filter on just PWB division.
- Using the data dictionary, you will see “Division Description” is in the Contract dimension. You will need to expand the “more fields”
- Right click and add to filter



Q: Which county received the most PWB contract \$ in 2006?

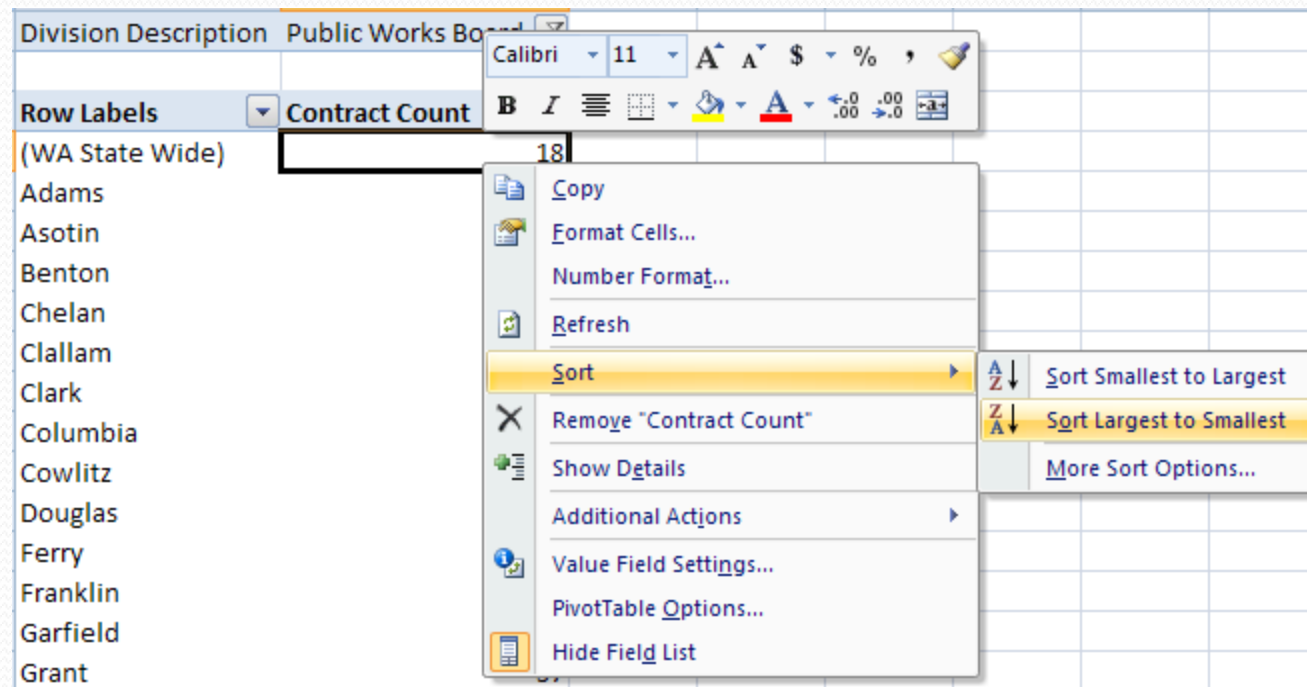
- Now filter Division to Public Works Board
- We need to filter and show counties. Select “County Name” from within the BenefitingCountyCity dimension





Q: Which county received the most PWB contract \$ in 2006?

- To sort a column, you right click any of the values, select “Sort” and for our test question, sort “Largest to Smallest”



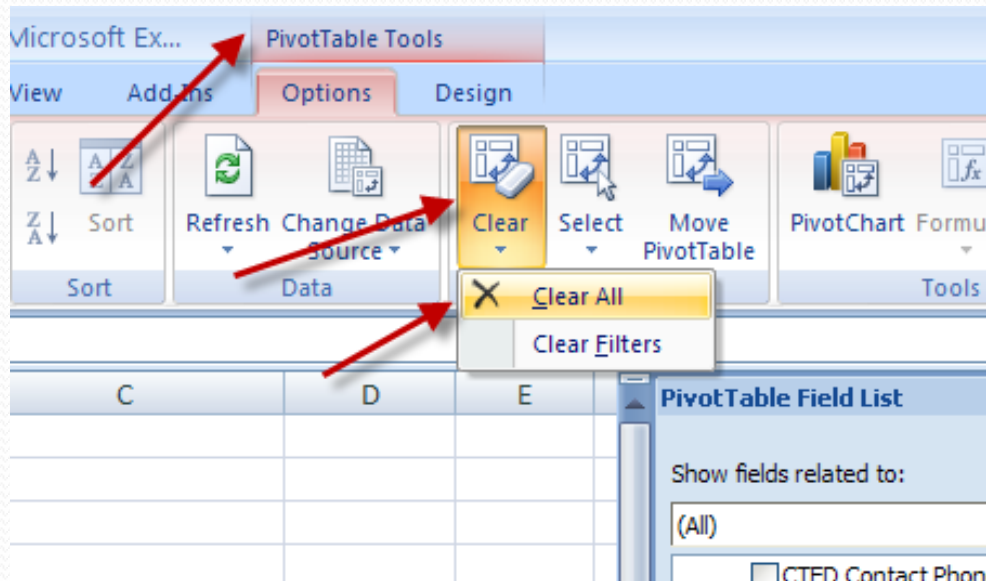
Q: Which county received the most PWB contract \$ in 2006?

- We now have our answer – Snohomish County received the most PWB \$ in 2006

Division Description	Public Works Board
Contract Start Year Name	2006
Row Labels	Contract Total Amount
Snohomish	\$47,434,983.00
King	\$41,992,891.14
Pierce	\$21,808,138.46
Clark	\$14,613,525.00
Skagit	\$14,000,000.00
Yakima	\$10,534,712.29
Spokane	\$8,289,887.58
Thurston	\$7,132,518.00
Okanogan	\$6,739,000.00
Whatcom	\$6,705,625.00

## Clearing the workspace

- Make sure to hit the “Pivot Table Tools” link to expose this button
- Select “Clear All”
- All labels, filters, and measures will be auto cleared from our workspace



# Next Question

- Have the # of CDBG grants increased or decreased in Lewis County from 2003 to 2004?
- Always select what it is you are measuring first before adding attributes to your analysis
  - This question is looking for Contract Count – so in the “Contract” measure – click “Contract Count”

The screenshot shows an Excel PivotTable and its corresponding PivotTable Field List. The PivotTable is located in the range A1:C14. The first row (A1) contains the text 'Contract Count'. The second row (A2) contains the value '10,788'. A red arrow points from the text 'Notice it displays the count here' to the value '10,788' in cell A2. The PivotTable Field List is open on the right side of the screen. It shows the following fields:

- Contract** (Summarize by):
  - ☒ Contract Count
  - ☐ Contract Total Amount
  - ☐ Hard Match Amount
  - ☐ Soft Match Amount
- Contract Location** (Summarize by):
- Fund** (Summarize by):
- Contract** (Filter by):
  - ☐ AG Code Description

The PivotTable Field List also includes sections for 'Report Filter', 'Row Labels', and 'Column Labels', which are currently empty.

Q: Have the # CDBG grants increased or decreased in Lewis County from 2003 to 2004?

- Now we add our first attribute – we look for “Program Description”. To find what dimension this exists in, you could either scroll through each dimension, or use the Data Dictionary
- You will find it is in the “Contract” container – click the check box

1	Row Labels	Contract Count
2	Access to Telework Loan Fund	2
3	Administrative Services Projects - No Program Relationship	43
4	Adult Basic Education	1
5	Affordable Housing & Assistance	2
6	Affordable Housing Advisory Board	1
7	Annexation Study	1
8	Asset Development	19
9	Asset Development Program	1
10	Associate Development Organizations	72
11	Base Realignment and Closure	7
12	Basic Food & Nutrition Education Program	56
13	Brownfields Clean-up Revolving Loan Fund	34
14	Building for the Arts	74
15	Byrne Formula Grant	14
16	Capital Projects	67
17	Child Care Facility Fund	98
18	Civil Indigent Legal Services	4
19	Closing the Achievement Gap	1
20	Cluster Based Economic Development	4

These rows will  
auto appear on  
left side

**Contract**

☐ AG Code Description

☐ Amended Yes No

☐ Assigned LPLLC Yes No

☐ Assignee Name

☐ Assignee Tax Id Number

☐ CFDA Num Description

☐ Contract ID

☐ Contract Number

☐ Contract Type

☐ Contractor Contact Email

☐ Contractor Contact Fax

☐ Contractor Contact Name

☐ Contractor Contact Phone

☐ CTED Contact Name

☐ CTED Contact Phone

☐ Division Description

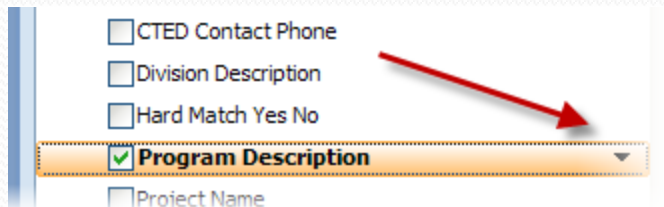
☐ Hard Match Yes No

☒ **Program Description**

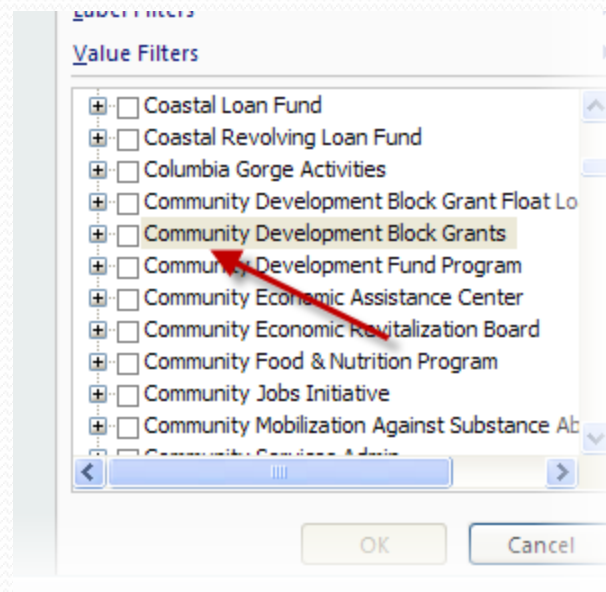
☐ Project Name

Q: Have the # of CDBG grants increased or decreased in Lewis County from 2003 to 2004?

- Filter is on CDBG grants – “Community Development Block Grants”
- Within the “Contract” container, hit the pull down on “Program Description”
- Unselect “Select All” and scroll down and select “Community Development Block Grants”



A screenshot of a filter menu. It contains several items with checkboxes: "CTED Contact Phone", "Division Description", "Hard Match Yes No", "Program Description" (which is checked and highlighted with an orange background), and "Project Name". A red arrow points to the dropdown arrow on the right side of the "Program Description" item.

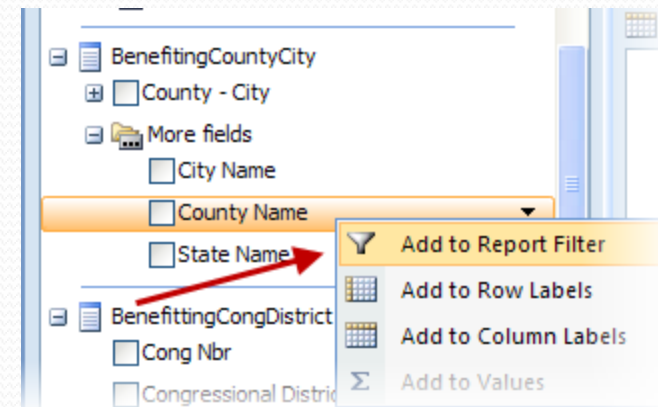


A screenshot of a "Value Filters" dialog box. It has a title bar "Value Filters" and a list of items, each with a plus icon and a checkbox. The items are: "Coastal Loan Fund", "Coastal Revolving Loan Fund", "Columbia Gorge Activities", "Community Development Block Grant Float Lo", "Community Development Block Grants" (which is selected and highlighted with a yellow background), "Community Development Fund Program", "Community Economic Assistance Center", "Community Economic Revitalization Board", "Community Food & Nutrition Program", "Community Jobs Initiative", "Community Mobilization Against Substance Ab", and "Community Services Admin". A red arrow points to the "Community Development Block Grants" item. At the bottom of the dialog are "OK" and "Cancel" buttons.

Q: Have the # of CDBG grants increased or decreased in Lewis County from 2003 to 2004?

- Now we need to filter on Lewis County
  - In the DW; benefiting jurisdictions are in a County, City, Congressional district or Legislative District
- To filter on a benefiting County, select “County Name” in the “BenefitingCountyCity” dimension and filter on Lewis

	A	B
1	Jurisdiction Description	All
2		
3	Row Labels	Contract Count
4	Access to Telework Loan Fund	2
5	Administrative Services Projects - No Program R	43
6	Adult Basic Education	1
7	Affordable Housing & Assistance	2
8	Affordable Housing Advisory Board	1
9	Annexation Study	1



Q: Have the # of CDBG grants increased or decreased in Lewis County from 2003 to 2004?

- Now we need to add Contract Start Date – add it to the Column Labels then filter on 2003 and 2004

Report Filter

Column Labels

Contract Start Year Name

Row Labels

Program Description

County Name

Sort Z to A

More Sort Options...

Clear Filter From "Contract Start Ye..."

Date Filters

Value Filters

1999

2000

2001

2002

2003

2004

2005

2006

2007

2008

OK

Cancel

ContractStartDate

Biennium - Fiscal Year - Fiscal ...

Calendar Year - Quarter - Mon...

More fields

Contract Start Biennium

Contract Start Calendar Q...

Contract Start Date

Contract Start Day Name

Contract Start Day Num O...

Contract Start Day Num O...

Contract Start Day Type

Contract Start Fiscal Quar...

Contract Start Fiscal Year

Contract Start Last Day O...

Contract Start Month Name


Contract Start Week Name

Contract Start Year ...



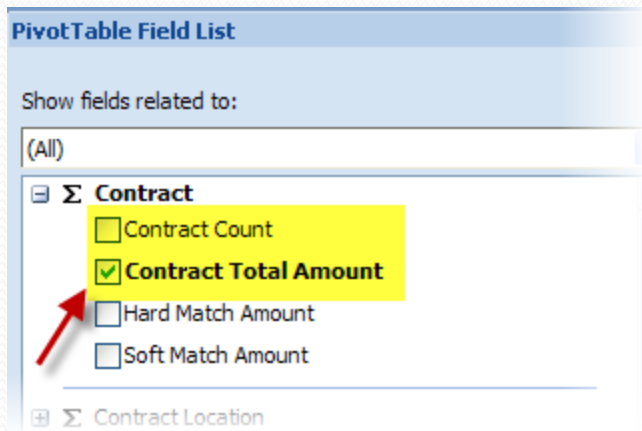
Q: Have the # of CDBG grants increased or decreased in Lewis County from 2003 to 2004?

- We now have enough information to answer the question. The analysis is reporting that in 2003 we had (1) CDBG grant whereas in 2004 we have (9) contracts – yes there has been an increase.
- At this point – you can save your analysis to perhaps return later and change it. You will have to do Save As from the Excel menu

Column Labels 			
2003		2004	Grand Total
	1	9	10
	1	9	10
	1	9	10

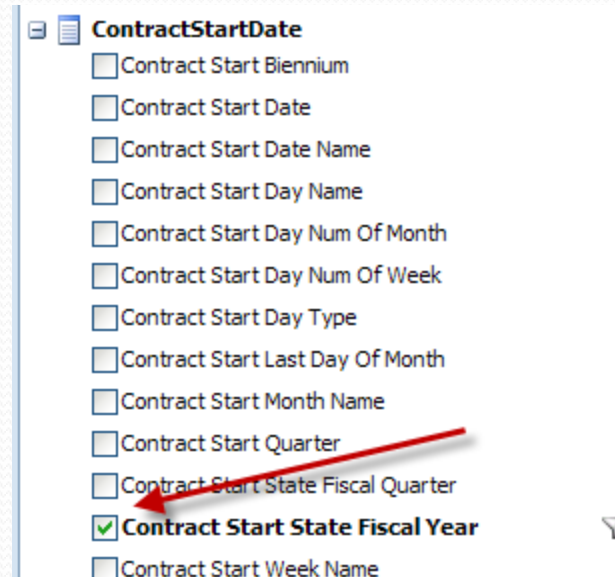
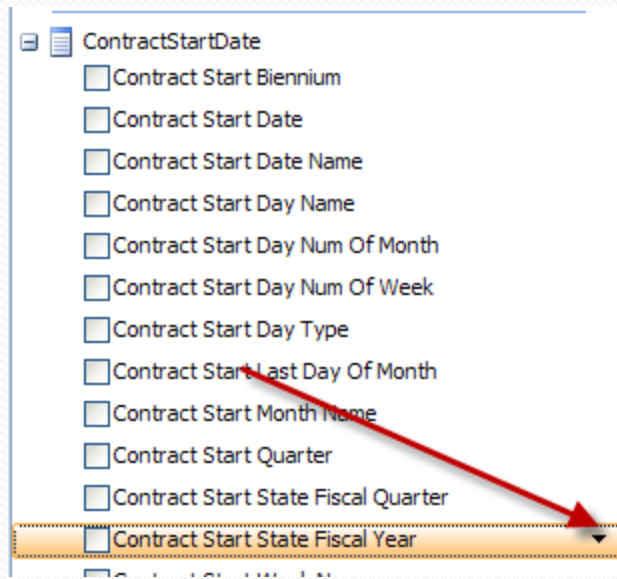
Q: Has the \$ amount of CDBG grants increased or decreased in Lewis County from Fiscal Year 2003 to 2004?

- This next question is really just a variation of our first question and an exercise in updating an existing analysis
- Note the question is speaking about “Fiscal Year” and dollar amounts
- Our task will be to add “Contract Total Amount”, and date filter to be on Fiscal Year
- Always start with the measures – remove the “Contract Count” and instead select “Contract Total Amount”



Q: Has the \$ amount of CDBG grants increased or decreased in Lewis County from Fiscal Year 2003 to 2004?

- We are now ready to add the Fiscal Year 2003 and 2004 to our analysis
- Un-check the “Contract Start Year Name
- Click the pull down for “Contract Start State Fiscal Year” and de-select “All”, then select the dates 2003 and 2004
- Then select the attribute so the years show on our workspace



Q: Has the \$ amount of CDBG grants increased or decreased in Lewis County from Fiscal Year 2003 to 2004?

- We can now answer that there was a significant dollar amount increase in 2004 over 2003

Contract Total Amount		Column Labels <input type="button" value="v"/>		
Row Labels <input type="button" value="v"/>	2003	2004	Grand Total	
Community Development Block Grants	\$14,549,337.27	\$29,567,064.56	\$44,116,401.83	
Grand Total	\$14,549,337.27	\$29,567,064.56	\$44,116,401.83	

# Totals are not adding up

- The data warehouse cube is designed to provide an unduplicated Grand Total for each column. To explain how this works, it's easiest to look at an example.
- Contracts can have multiple funding types. When you count contracts by funding type you will see that the Grand Total equals the number of contracts. If you sum the count of each funding type, you will find that there are many more funding types than contracts.

Funding Type Description ▼	Contract Count
CAPITAL	1,970
DEDICATED	2,869
FEDERAL	3,752
GENERAL FUND STATE BIEN	167
GENERAL FUND STATE YR 1	86
GENERAL FUND STATE YR 2	154
N/A	13
OTHER	121
PRIVATE LOCAL	308
PROVISIONAL	970
PROVISO BIEN	89
PROVISO YR1	55
PROVISO YR2	135
STATE GF 1ST	2,176
STATE GF 2ND	1,380
Grand Total	11,278

Sum of Funding Types
1,970
2,869
3,752
167
86
154
13
121
308
970
89
55
135
2,176
1,380
14,245

# Totals not adding up continued:

Here is a simple example, showing the contract numbers, to explain this, let's look at 3 different contract id's 18628, 18644, 18655 by Fund Description and Contract Count

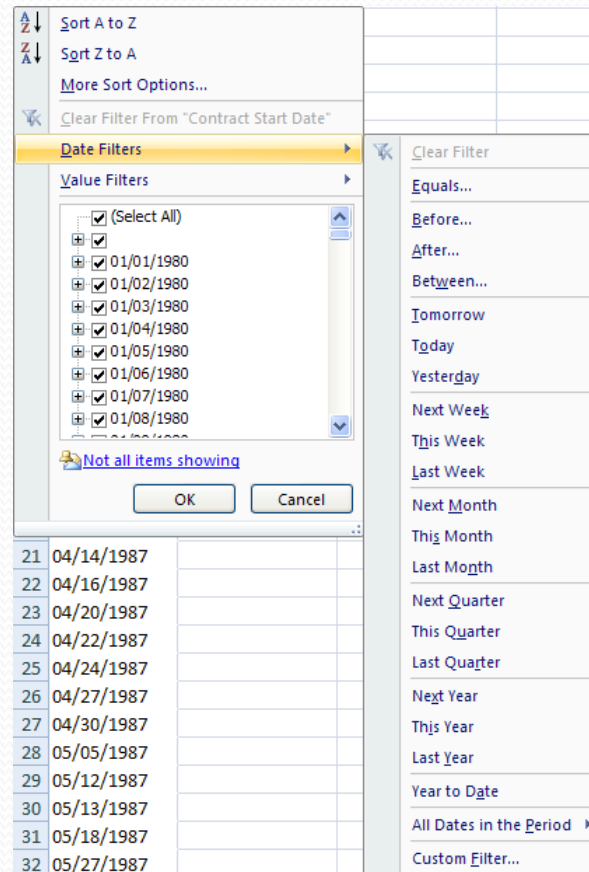
Row Labels	Contract Count
PROVISO YR1	1
18628	1
PROVISO YR2	3
18628	1
18644	1
18655	1
Grand Total	3

Row Labels	Contract Count
PROVISO YR1	1
PROVISO YR2	3
Grand Total	3

When we collapse the fund types, we can see there is one contract for fund type Proviso YR1 and 3 contracts under Proviso YR2. We do not have 4 unique contracts – we have 3 contracts that span two fund types.

# Date Filtering

- Date filtering now has enhanced filter types on all date dimensions



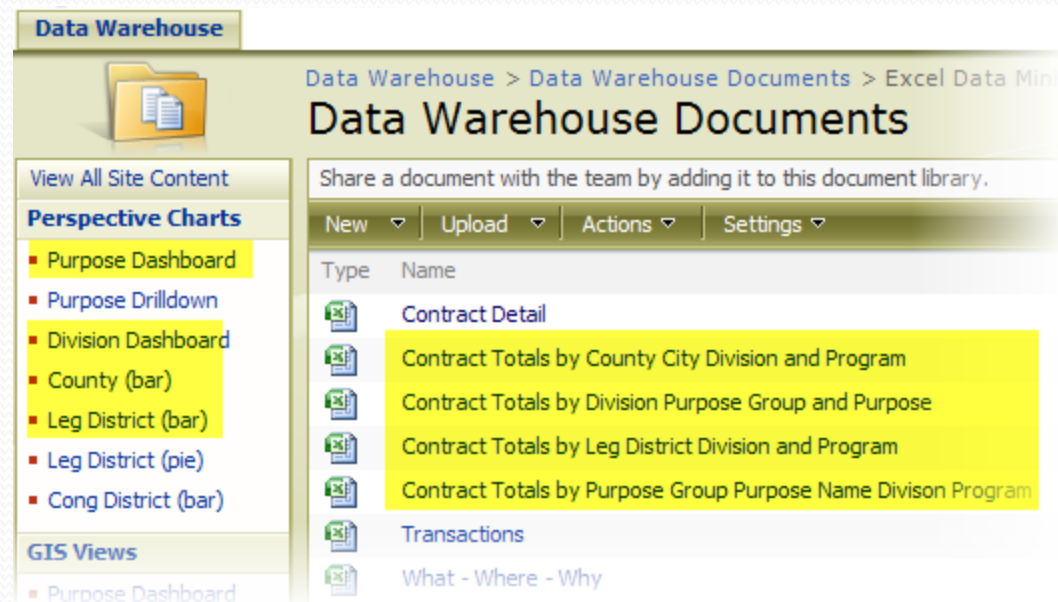
# AFRS Transactions

- Starting with the October 2008 data warehouse load, AFRS data is being included. CASO contract id is matched to the Contract No in CTED ADDS database. All transactions where those numbers match are included. Contracts disbursed before the CASO contract id was entered in AFRS will have no transactions.
- The transaction details include the AFRS coding, the transaction date, posting month and adjusting month. The data warehouse then calculates the Budget Amount, Disbursed Amount and Balance Remaining by coding line.
- Budget Amount = the CASO Contract Change Amount
- Disbursed Amount = the sum of the AFRS transactions
- Balance Remaining = Budget Amount – Disbursed Amount
- We have added AFRS Transaction measure and Contract Balance measure.
- We have added three new dimensions: AFRSAdjustingMonth, AFRSPostingMonth and AFRSTransactionDate. These three dimensions are related to AFRS Transaction.



# Pre-Designed Excel workbook

- Remember we said some of the Excel workbooks mimic our Dashboard reports – let's open the “Contract Totals by Purpose Group Purpose name Division Program”



- Let's compare the Excel workbook with the Dashboard. We must make sure the Excel filters match our Dashboard filters:

	A	B
1	Contract Start Biennium	(Multiple Items)
2	Contract Type	(Multiple Items)
3	Is Infrastructure Contract	No
4	Is ARRA Contract	All
5	Is Primary Purpose	All
6		
7		Values
8	Row Labels	Contract Total Amount Con

Data Warehouse > Data Warehouse Documents > Perspective Charts > Purpose Group Dashboard

## Purpose Group Dashboard

Contract Type: **Grant , Grant/Loan Combination , Loan**

Start Biennium: **2005-2007 , 2007-2009**

Purpose Group

Infrastructure: No

Recovery Act: All

Division-->Program

- Once the filters match – the totals should also match

Data Warehouse > Data Warehouse Documents > Perspective Charts > Purpose Group Dashboard

## Purpose Group Dashboard

Contract Type: **Grant , Grant/Loan Combination , Loan** ▼

Infrastructure: **No** ▼

Start Biennium: **2005-2007 , 2007-2009** ▼

Recovery Act: **All** ▼

Purpose Group

▼ Division-->Program

	Total
<b>Grand Total</b>	<b>616,590,301</b>
_No Purpose Group Assigned	14,627,749
Administration	4,198,500
Climate Change	1,157,000

### Contract Totals by Division

for Purpose Group:

**Total dollar amount: \$616,590,301**

...	\$37,717,305.00
Economic Development	\$25,000.00
	\$37,692,305.00
	\$325,938,560.87
	\$324,701,310.87
	<b>\$1,237,250.00</b>
	<b>\$616,590,301.00</b>